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LUMINARY Memo #49

To: Distribution
From: C. Schulenberg
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Subject: LUMINARY Revisions 44-47

Major Changes Incorporated into Revision 44

- 1) A new entry was added both to the BAILOUT and to the POODOO error routine (BAILOUT1 and POODOO1 respectively). The new entries were designed to be used when an abortive situation was detected within a general subroutine that might have many different callers, i. e. within WAITLIST, EXECUTIVE, INTERPRETER, etc. These new routines allow the caller to specify in A and L the location and bank which should be placed in ALMCADR and ALMCADR +1. Thus when a SQRT 1302 abort occurs for example, the ALMCADRs will point at the interpretive code responsible rather than at the Interpreter routine itself.
- 2) In connection with item 1 the following BAILOUT's were made into BAILOUT1's: 1104, 1207, 1211, and 1203.
- 3) In connection with item 1 the following POODOO's were made into POODOO1's: 1210, 1301, and 1302.
- 4) A new abort code, 1204, was added. WAITLIST, TWIDDLE, VARDELAY, FIXDELAY, and LONGCALL were altered to do a POODOO1 with abort code 1204 if the inputted delta-time is zero or negative.
- 5) A bug was corrected in the POODOO/POODOO1 routine. Servicer was being abruptly terminated without V37FLAG and AVEGFLAG being reset. This had the effect of stymieing subsequent V37's.
- 6) The priority of the GETDAT job in AOTMARK was changed from 32 to 15. This alleviated a Sundance priority problem.
- 7) A correction was made to the P22 Orbital-Plane-Change logic.
- 8) PCR 507.2 was implemented. This means that a Verb 96 will terminate all further state vector updates until P00 is reselected. Previously, only the first update following the V96 was bypassed.

- 9) An initialization problem was fixed in the part of ascent guidance used by P12 for preburn computations. The result of this was that the noun 74 display of final Yaw and Pitch was somewhat in error.
- 10) PCR 531.2 was implemented. This added a 1 minute extrapolation in R63.
- 11) An autopilot change was made to allow offset nulling when in docked manual-modes powered flight.
- 12) Changes were made to R77 and to its erasables in order to allow the routine to be later removed from the extended verb interlock. In addition, a program error was corrected.
- 13) A program error was corrected in the TTFINCR routine of the Landing Guidance.
- 14) The R12 routine (LR update routine) was modified to test the erasable WCHPHASE instead of TTF/8 in order to ascertain whether or not HIGATE had been reached. The check of TTF/8 was not reliable and thus R12 did not always initiate the position change.
- 15) Verb 85 was changed so as to 1) insure the noun 75 display varied from 0 to 360 degrees and 2) increase wait time between computational loops.

Major Changes Incorporated into Revision 47

Note: Revision 47 was made to correct serious problems arising in Revs. 45 and 46.

- 1) RVBOTH, the CSM state vector average-g updater run during landings and ascents for the sake of R29, was restart protected.
- 2) The R10/R11 interrupt which propagates itself seven times following the Readaccs task which initiates the first of the sequence, was modified to use WAITLIST's rather than FIXDELAY's. This insures the rupts will be as regular as possible. By making Readaccs set up R10/R11 .200 seconds later, the final or eighth R10/R11 will begin 50 ms before the next Readaccs. This allowed the simplification of letting the last R10/R11 rupt perform LRHTASK for R12 instead of setting up LRHTASK as a WAITLIST in Readaccs.
- 3) The POODOO/POODOO1 routine was modified to leave Servicer in operation if it had been running. Thus if Servicer had been on and a POODOO had been caused for some reason, V37 would flash on the DSKY as before but with the difference that the state vectors were still intact and could be copied back into the permanent state vectors by the AVETOMID routine.
- 4) The Ignition routine was modified so that Ascent guidance is not brought into the Servicer loop at all until P12 ignition. In addition, the Ascent guidance was changed to use group 3 instead of group 5

for restart protection. This was necessitated by item #3.

- 5) A new flag named AUXFLAG was defined for use by DVMON. Working as a flip-flop indicator it causes DVMON to delay one cycle after being enabled before examining thrust levels.
- 6) R10 was split into two T3RUPTS separated by a FIXDELAY of 20 milliseconds. This was done to decrease the longest period of time spent in interrupt in order to minimize the number of down-rpts lost.
- 7) The restart coding was modified so as to not enable R25 on a restart. This was done to prevent R25 from springing to life in the descent or ascent when either R29 or R10 were running.
- 8) V41N72 was modified to clear bits 15 and 10 of RADMODES and to clear the error counters in case bad inputs were detected.
- 9) Further corrections were made to the Orbital-Plane-Change logic of P22.
- 10) A restart bug was fixed in the Ascent Guidance and coding was inserted to skip FINDCDUW if it had been interrupted by a restart.
- 11) A missing INHINT was added to GETAOSUV in the autopilot.
- 12) P12 was corrected so as to disable R25.
- 13) Coding was added to V56 and to V37 (when P00 is being selected) to enable R25.
- 14) GOTOPOOH was modified to turn off ullage and enable X-axis override capability.
- 15) Coding was added to the P70 and P71 lead-in to allow X-axis overrides.
- 16) An erasable conflict was fixed by ceasing to let the R60 inputs SCAXIS and POINTVSM overlay the targeting erasables.
- 17) Coding was added to the software restart routine to clear bits 1, 11, 13, and 14 of RADMODES since tasks associated with those bits were necessarily terminated by the restart. Also, if R29 had been running, bit 10 is cleared as well.
- 18) A bug was fixed which had made it impossible to terminate the V06N62 display of P63 via V34E.
- 19) The priority of CHANGEVB (a novac job initiated by AOTMARK) was decreased from 32 to 15.
- 20) The V50N25 display in R04 was changed to a mark-type display. Coding was also added to blank R3 of noun 75 in Verb 85.